



The distribution of return times over Continental U.S.A. A climatology

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Extreme value theory is concerned with probabilistic and statistical questions related to very high or very low values in sequences of random variables. The subject has a rich mathematical theory and also a long tradition of applications in a variety of areas, especially in applied science like hydrology. The present study is focused on the statistical analysis of extreme rain events as deduced from the precipitation time series analysis for the United States derived from the CPC (Climate Prediction Center) US Unified precipitation data set. A Unified Raingauge Dataset (URD) has been developed from multiple sources of U.S. raingauge data. Tests to eliminate duplicates and overlapping stations, standard deviation and buddy checks were applied. Then they were gridded into $0.25^\circ \times 0.25^\circ$ (140° W to 60° W, 20° N to 60° N) using a Cressman scheme.

In the present study, the seasonal cycle has been filtered and the signals has been normalized. The return times of extreme event are computed using the Point Over Threshold (POT) method. By using this method a threshold is chosen and all the measurements over the threshold are considered as an extreme event. In our analysis the threshold chosen is 4.2 standard deviation. The distribution of the extreme events is a Pareto Distribution and the return times can be computed using the Poisson hypothesis for uncorrelated events.

This analysis has been applied to the entire dataset and to every month (all the January, all the February, etc.) to evaluate what is the distribution of extreme events over months and seasons.

The results show that the return times of extreme precipitation distribute over the United States with a pattern that has maxima over the Rocky Mountain, the East Cost, the West Cost, the South East. Over the central U.S. the return time of extreme events

appears to be lower than the rest of the country.

The relationship between the distribution of the return time of extreme events and the climatological mean behaviour is finally presented by analysing other meteorological fields.